

# **MORES CREEK RIM RANCH WATER DISTRICT (PWS 4080029) SOURCE WATER ASSESSMENT FINAL REPORT**

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**January 2, 2003**



## **State of Idaho Department of Environmental Quality**

**Disclaimer:** This publication has been developed as part of an informational service for the source water assessments of public water systems in Idaho and is based on data available at the time and the professional judgement of the staff. Although reasonable efforts have been made to present accurate information, no guarantees, including expressed or implied warranties of any kind, are made with respect to this publication by the State of Idaho or any of its agencies, employees, or agents, who also assume no legal responsibility for the accuracy of presentations, comments, or other information in this publication. The assessment is subject to modification if new data is produced.

## Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for Mores Creek Rim Ranch Water District, Idaho City, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Mores Creek Rim Ranch Water District public water system (PWS #4080029) consists of four wells: Well #1 Upper-Lot 52, Well #2, Well #3-Lot 10, and Well #4. The system serves approximately 180 people through 62 connections.

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories, inorganic chemical (IOC, i.e. nitrates, arsenic) contaminants, volatile organic chemical (VOC, i.e. petroleum products) contaminants, synthetic organic chemical (SOC, i.e. pesticides) contaminants, and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

Information provided in a February 15, 2002 letter indicates that Well #1 Upper- Lot 52 has been withdrawn from service since October 1999. Since the well has not been officially abandoned, a delineation and susceptibility analysis was completed. In terms of total susceptibility, Well #1 Upper- Lot 52 automatically rated high for VOCs and SOCs because access is not restricted to vehicular traffic within 50 feet of the wellhead. Well #1 Upper rated moderate susceptibility for IOCs and microbial contaminants. The system construction score rated moderate and the hydrologic sensitivity score rated high. Potential contaminant inventory/land use scores were low for all categories.

In terms of total susceptibility, Well #2 Lower automatically rated high for IOCs because of an exceedance of the maximum contaminant level (MCL) of arsenic in March 1995. Well #2 Lower rated moderate susceptibility for VOCs, SOCs, and microbial contaminants. The system construction score and the hydrologic sensitivity score rated moderate. Potential contaminant inventory/land use scores were low for all categories.

In terms of total susceptibility, Well #3-Lot 10 automatically rated high for IOCs because of multiple exceedances of the MCL of arsenic, automatically high for VOCs due to a detection of toluene in December 1997, and low for SOC and microbial contaminants. The system construction score and the hydrologic sensitivity score rated moderate. Potential contaminant inventory/land use scores were low for all categories.

In terms of total susceptibility, Well #4 rated moderate for all contaminant categories. The system construction score rated high and the hydrologic sensitivity score rated moderate. Potential contaminant inventory/land use scores were low for all categories.

For the assessment, a review of laboratory tests was conducted using the Idaho Drinking Water Information Management System (DWIMS) and the State Drinking Water Information System (SDWIS). No SOC or microbials have ever been detected in the tested water. Well #3-Lot 10 recorded the VOC toluene at a level of 33.8 parts per billion (ppb) in December 1997 as well as the VOC chloroform in December 1997. Chloroform is usually related to disinfection processes and is generally not a problem with the source water. Traces of the IOCs fluoride, aluminum, hydrogen sulfide, iron, lead, nickel, zinc, and nitrate have been detected in the wells. Since March 1995, arsenic has exceeded the MCL of 50 ppb. In March 1995, arsenic was measured at 154 ppb in Well #2 Lower. In February through June 2000, arsenic was measured at levels between 65 ppb and 190 ppb. In October 2001, the EPA lowered the MCL for arsenic from 50 ppb to 10 ppb, giving systems until 2006 to come into compliance. In December 2001, arsenic was measured at 114 ppb.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the Mores Creek Rim Ranch Water District, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). Actions should be taken to keep a 50-foot radius circle around the wellheads clear of potential contaminants. Restricting access to vehicles and other unauthorized access within this 50-foot radius circle would reduce the susceptibility scores of Well #1 Upper-Lot 52 from high to moderate. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated assessment areas are outside the direct jurisdiction of Mores Creek Rim Ranch Water District, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success. Because the arsenic in the well has exceeded the level of the MCL, the Mores Creek Rim Ranch Water District water users may need to consider implementing engineering controls to monitor and maintain or reduce the level of this contaminant in the water system.

The EPA plans to provide up to \$20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the recently revised MCL. EPA (2002) recently released issue papers entitled *Proven Alternatives for Aboveground Treatment of Arsenic in Groundwater* and *Arsenic Treatment Technologies for Soil, Waste, and Water (EPA 542-R-02-004)*. These issue papers discuss various treatment options for arsenic and give examples of where each of these technologies have been applied. Information can be accessed at the following EPA website <http://www.epa.gov/safewater/arsenic.html>.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near residential land uses areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. The primary source of potential contaminants comes from the transportation corridor (Highway 21) within the delineation. Therefore the Department of Transportation or other federal agencies should be involved in protection activities.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

# **SOURCE WATER ASSESSMENT FOR MORES CREEK RIM RANCH WATER DISTRICT, IDAHO**

## **Section 1. Introduction - Basis for Assessment**

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this assessment means.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are included. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is included.

### **Background**

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

### **Level of Accuracy and Purpose of the Assessment**

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a drinking water protection program should be determined by the local community based on its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

## **Section 2. Conducting the Assessment**

### **General Description of the Source Water Quality**

The Mores Creek Rim Ranch Water District public water system (PWS #4080029) consists of four wells: Well #1 Upper-Lot 52, Well #2, Well #3-Lot 10, and Well #4. A letter dated February 15, 2002 indicates that the Well #1 Upper-Lot 52 well was withdrawn from service since October 1999. However, the DEQ files do not indicate that the well has been abandoned and as such is included in this assessment. The system serves approximately 180 people through 62 connections. The wells are located to the east of Mores Creek (Figure 1).

No SOC's or microbials have ever been detected in the tested water. Well #3 recorded the VOC toluene at a level of 33.8 parts per billion (ppb) in December 1997 as well as the VOC chloroform in December 1997. Chloroform is usually related to disinfection processes and is generally not a problem with the source water. Traces of the IOC's fluoride, aluminum, hydrogen sulfide, iron, lead, nickel, zinc, and nitrate have been detected in the wells.

The primary contaminant issue with the Mores Creek Rim Ranch Water District is arsenic. Since March 1995, arsenic has exceeded the MCL of 50 ppb. In March 1995, arsenic was measured at 154 ppb in Well #2 Lower. In February through June 2000, arsenic was measured at levels between 65 ppb and 190 ppb. In October 2001, the EPA lowered the MCL for arsenic from 50 ppb to 10 ppb, giving systems until 2006 to come into compliance. In December 2001, arsenic was measured at 114 ppb.

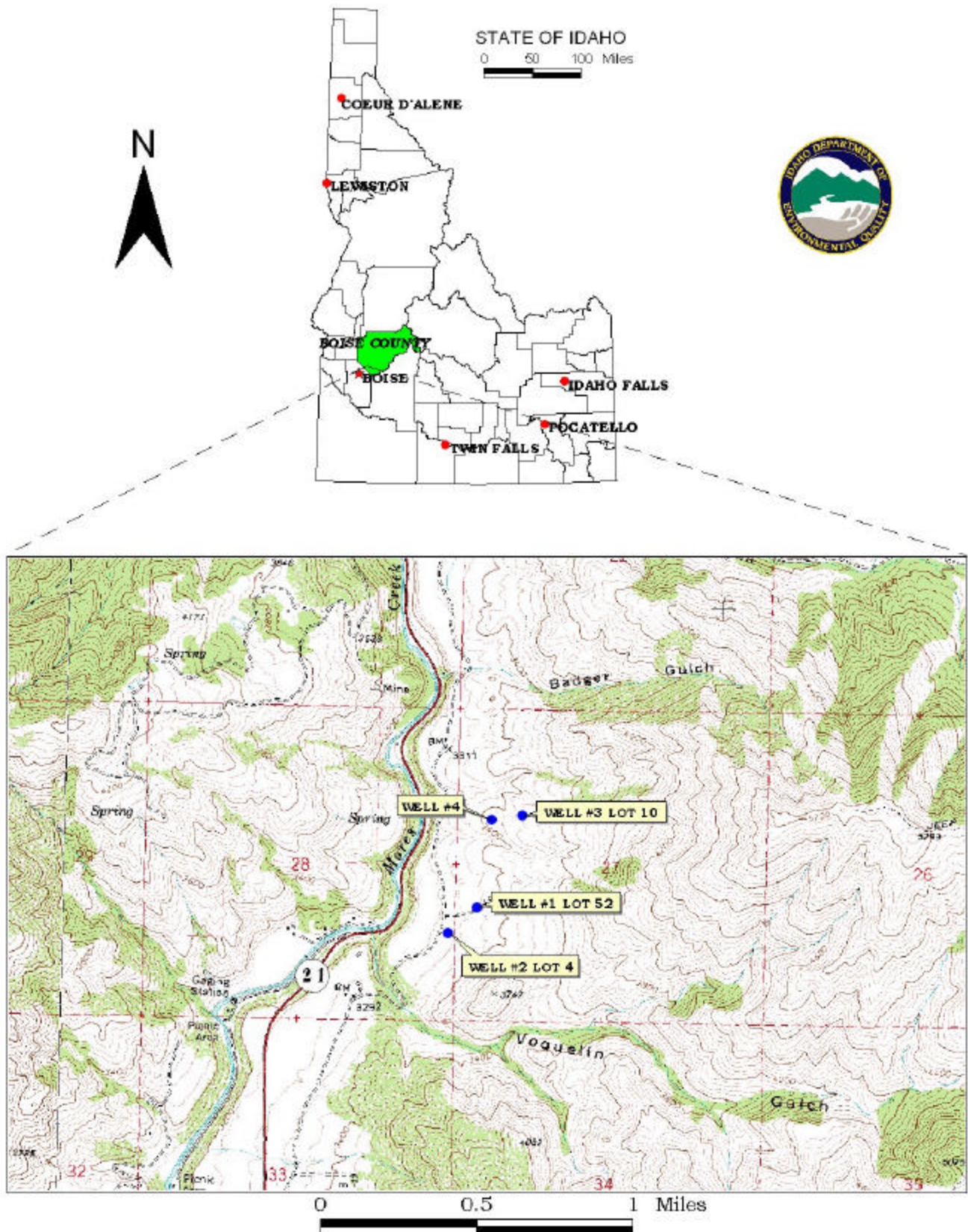
### **Defining the Zones of Contribution – Delineation**

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ performed the delineation using a refined analytical element computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the Mores Creek aquifer in the vicinity of the Mores Creek Rim Ranch Water District. The computer model used site specific data, assimilated by DEQ from a variety of sources including Mores Creek Rim Ranch Water District well logs, other local area well logs, and hydrogeologic reports (detailed below).

### **General Geology for the Mores Creek aquifer system**

The Mores Creek province lies in the southern part of the Northern Rocky Mountain Physiographic Province, just north of the Snake River Plain subdivision of the Columbia Plateau Physiographic Province. Soils formed in alluvial and colluvial sediments and on bedrock surfaces. The Mores Creek Basalt apparently erupted from vents and inundated the ancestral Mores Creek Valley (Otheberg, 1994). Subsequent erosion by Mores Creek has exposed the basalt in the canyon. Surficial soils are underlain by biotite granodiorite rock ("granite") of the Idaho Batholith, which is the predominant rock type in the region (Kiilsgard et al., 1997).

**FIGURE 1. Geographic Location of Mores Creek Rim Ranch Water District**



Northeast-trending faults occur throughout the area. These faults are not known to be active and form part of the trans-Challis Fault System that extends over 60 miles from the Boise Front to east central Idaho. Springs, topography, stratigraphic relations, and lithologic changes often are used to infer fault locations. These are high-angle normal faults that often form grabens (Idaho Geological Survey, 1991). The fault zones are described as shear zones (Scanlan, 1986), which can be filled with clayey fault gouge. In shear zones where fault gouge is not present the crushed rock acts as a zone of high permeability.

## **Climate**

Precipitation at Idaho City has averaged about 23 inches per year from 1917 to 1995, with most precipitation occurring from November through March. The temperature during these months ranges from 23.5 °F to 34.2 °F ([www.worldclimate.com](http://www.worldclimate.com)). Discharge is measured in Mores Creek at Robie Creek near the Arrowrock Dam (USGS Station 13200000). The long term median flow values are based on 51 years of data. The long term median peak flow in April and May is 846 cubic feet per second (cfs), with the long term median low flow of about 40 cfs from July through October ([id.waterdata.usgs.gov](http://id.waterdata.usgs.gov)).

## **Southern End of Mores Creek Delineations**

The system well logs as well as the surrounding well logs show that the water table generally follows Mores Creek. Water from the rising topography to either side of the creek flows towards the creek. Water from upstream flows downstream towards Lucky Peak Reservoir. Kiilsgard et al. (1997) shows numerous faults in the area that could control recharge. Therefore, boundary conditions were assigned to the Kelly Gulch Fault to the northwest. Other local faults were added to various simulations as no flow boundaries to investigate flow direction. As the faults could be flux boundaries, final delineations were allowed to cross fault traces. A flux of water was added along the Kelly Gulch Fault to match test points in Daggett and Robie Creeks. With the downgradient constant head at Lucky Peak, the model's water table gradient was constrained.

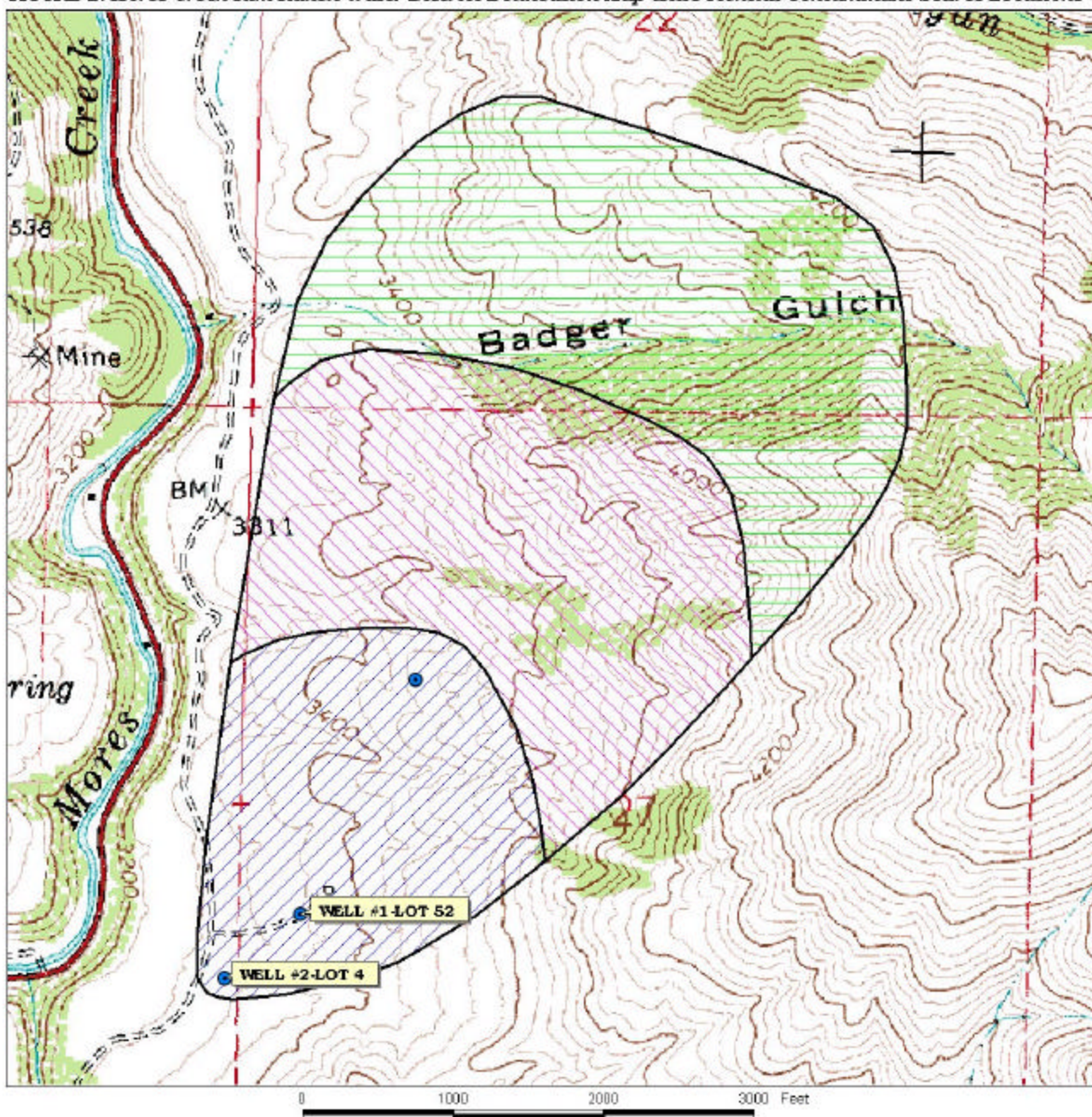
Despite the large quantities of water in the valley, recharge was kept quite low (0 to 0.85 inches per year) since the major rock type is granite.

## **Mores Creek Rim Ranch Water District #1, #2, #4; Ranch Subdivision; Wilderness Ranch**

These eight wells were modeled simultaneously to take into account well interference. The well logs show that the producing zones are mostly in white or brown granite (except for Mores Creek Rim Ranch #4). In each case, the static water table relative to Mores Creek and the nearby wells fits the overall potentiometric surface of the creek. As exact elevations for the ground surface of the wells is not known, the potentiometric surface depths cannot be compared.

Well #1 Upper-Lot 52 and Well #2 Lower share the same delineation due to their proximity to each other. The delineation (Figure 2) extends to the north-northeast and is approximately 1 mile long and 4,000 feet wide at the end. The Well #4 delineation (Figure 4) extends 1.5 miles to the northeast and is 2,000 feet wide where it crosses Dunnigan Creek.

FIGURE 2. Mores Creek Rim Ranch Water District Delineation Map and Potential Contaminant Source Locations



**PWS# 4080029**  
**WELL #1 - LOT 52**  
**WELL #2 - LOT 4**

### **Mores Creek Rim Ranch #3**

The Mores Creek Rim Ranch Well #3 was modeled separately because the nature of the potentiometric surface and the specific capacity test did not conform to the other wells. In this well, the static water table showed little confining pressure and was open to a high producing fracture zone. Unlike the average hydraulic conductivity of about 6.0 feet per day, the specific capacity test for Mores Creek #3 showed a value of 76 feet per day, an order of magnitude greater.

It is surmised that Mores Creek Rim Ranch #3 draws water from one of the local faults in the area. Therefore, the delineation for this well parallels a fault to the southeast of the well site and crosses a fault to the northwest (Figure 3). The delineation extends to the northeast and is over 2 miles long and 1 mile wide at the end.

### **Identifying Potential Sources of Contamination**

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources.

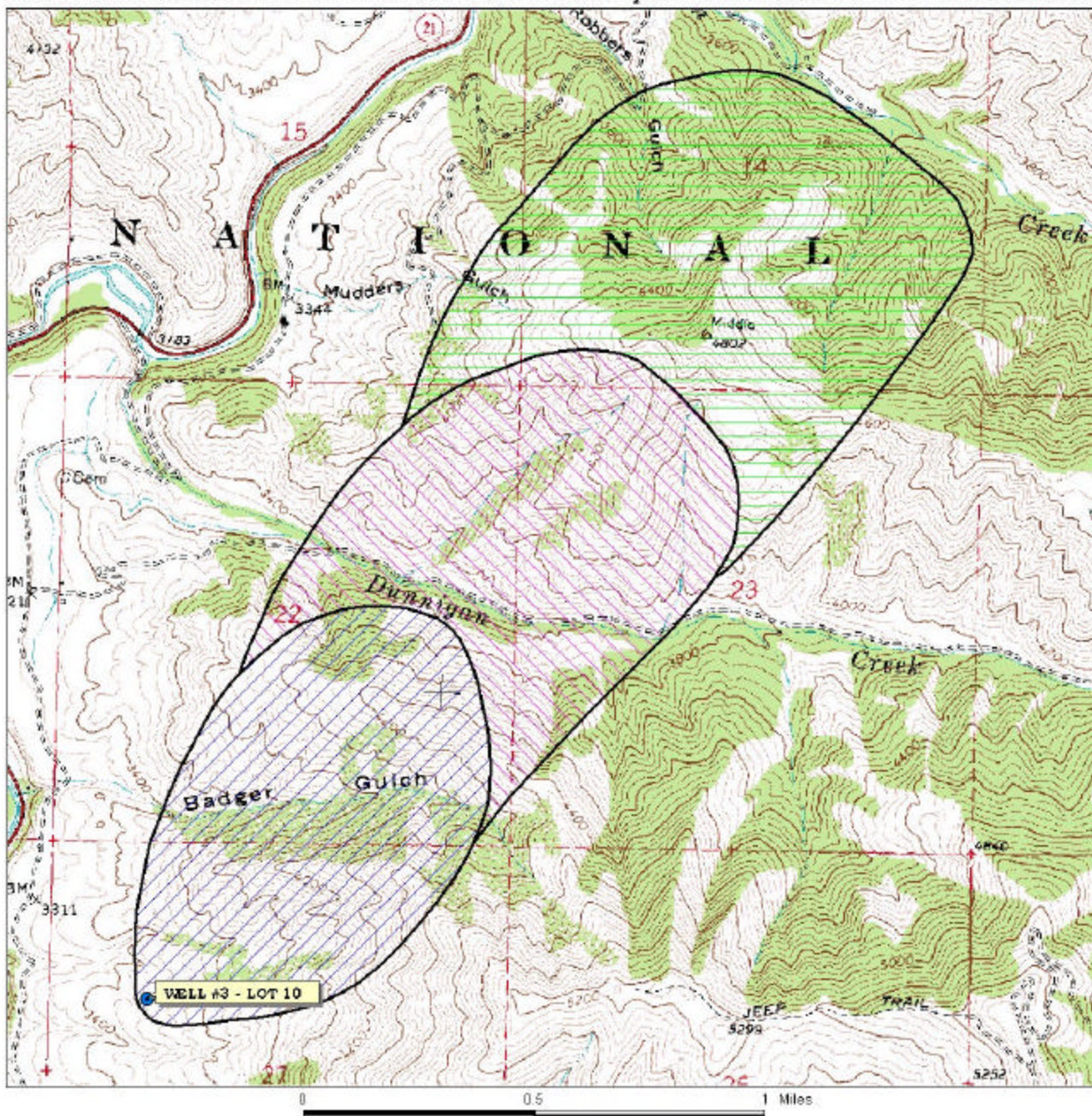
The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases. Land use within the area surrounding the Mores Creek Rim Ranch Water District wells is predominately forested/range lands.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

### **Contaminant Source Inventory Process**

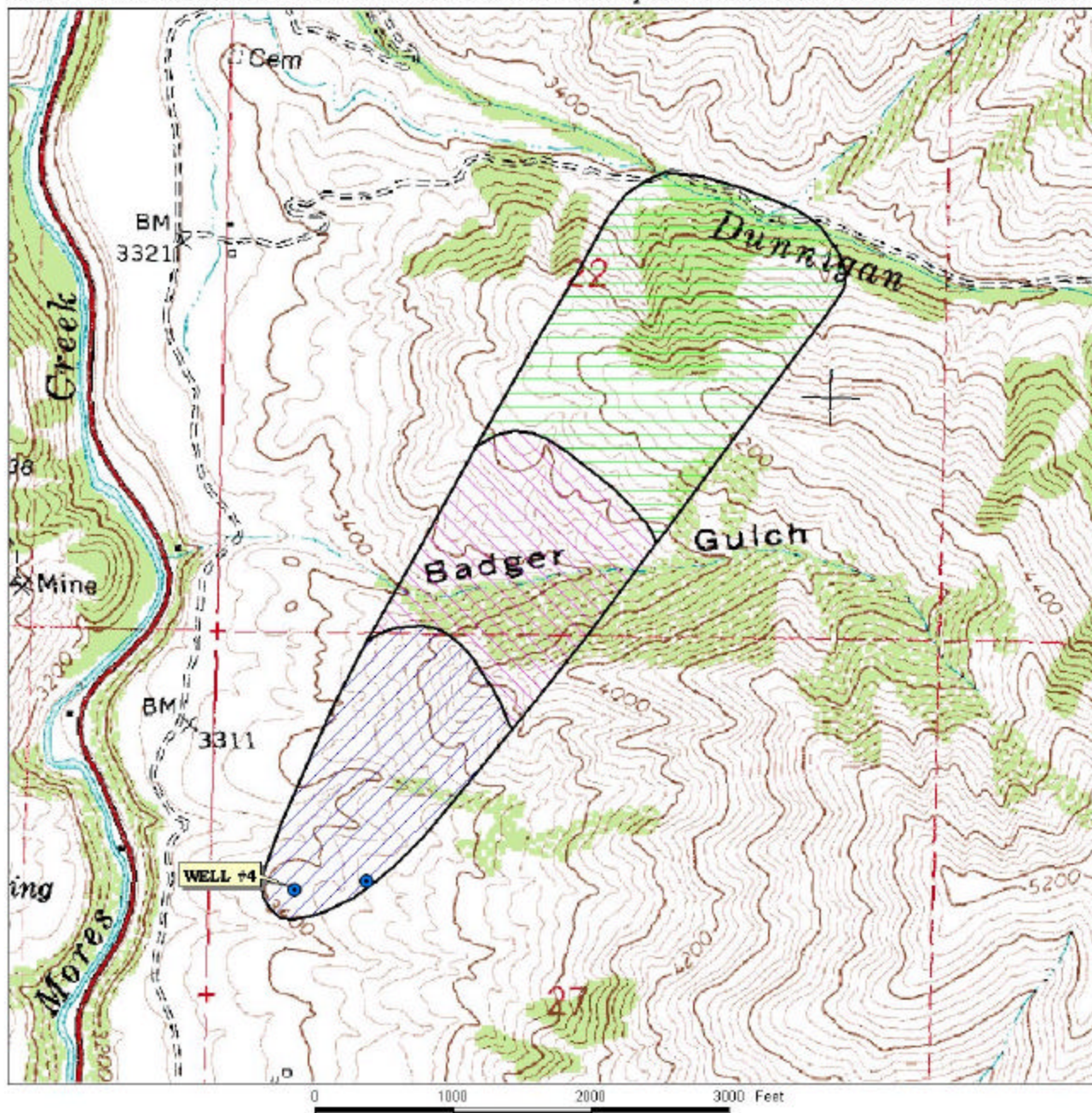
A two-phased contaminant inventory of the study area was conducted in August and September 2002. The first phase involved identifying and documenting potential contaminant sources within the Mores Creek Rim Ranch Water District source water assessment areas (Figures 2, 3, and 4) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the delineated areas.

**FIGURE 3. Mores Creek Rim Ranch Water District Delineation Map and Potential Contaminant Source Locations**



**PWS# 4080029**  
**WELL #3 - LOT 10**

FIGURE 4. Mores Creek Rim Ranch Water District Delineation Map and Potential Contaminant Source Locations



**PWS# 4080029**  
**WELL #4**

The delineated source water areas for the wells have as potential contaminants sources local roads within the water district, Badger Gulch, and Dunnigan Creek. Field surveys conducted by DEQ also show local horse pastures within the water district. Though not assessed specifically, it is also likely that there are numerous septic systems within the delineated areas.

### **Section 3. Susceptibility Analyses**

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

#### **Hydrologic Sensitivity**

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Well #1 Upper-Lot 52 rates high for hydrologic sensitivity (Table 2). Area soils are moderately to well drained. The available well log shows that the vadose zone is predominantly gravel, boulders, and sand and the water table is 150 feet below ground surface (bgs). In addition, there are not sufficient low permeability layers between the surface and the producing zones.

Well #2 Lower, Well #3-Lot 10, and Well #4 rate moderate for hydrologic sensitivity (Table 2). Area soils are moderately to well drained. The available well logs show that the vadose zones are predominantly brown and blue clay (Well #2 Lower), granite with some clay (Well #3-Lot 10), or clay and rhyolite (Well #4). The static water table ranges from 165 feet bgs (Well #2 Lower) to 429 feet bgs (Well #3-Lot 10). In addition, each of these 3 wells have sufficient low permeability clay layers between the surface and the producing zones to reduce the downward flow of contaminants.

## Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

Well #1 Upper-Lot 52, Well #2 Lower, and Well #3-Lot 10 rated moderate for well construction (Table 2). A sanitary survey was conducted in 1998 and found that the wells had adequate wellheads and surface seals and are protected from surface flooding. Well #4 rated high for system construction. Well #4 was not covered on the 1998 sanitary survey and, therefore, had insufficient information to assess wellhead protection activities. A summary of the well construction information is contained in Table 1.

**Table 1. Summary of Well Construction Information**

Well #	Drill Year	Depth (ft)	Casing: diameter/thickness (in)	Casing: depth (ft)/formation	Water Table Depth (ft)	Screened Interval (ft)	Surface seal: depth (ft)/formation	Sanitary Survey Elements*
#1 Upper-Lot 52	1977	475	6/0.250	201/Sand rock	120	201-475 open	20/Gravel, clay, boulders	Yes/Yes
#2 Lower	1978, 1992	505	6/0.250, 4/0.220	59/Brown clay; 486/Blue & white granite	165	486-505 open	20/Brown clay	Yes/Yes
#3-Lot 10	1997	500	8/0.250	497/Green salt & pepper granite	429	457-497	60/DeGranite some clay	Yes/Yes
#4	1997	600	6/0.250	196/Salt & pepper granite	182	196-600 open	60/Ryolite	No/No

\* Wellhead and surface seal adequate/Protected from surface flooding

Current PWS well construction standards are more stringent than when the wells were constructed. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the regulations deal with screening requirements, aquifer pump tests, use of a downturned casing vent, and thickness of casing. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Six-inch casings should be 0.280-inches thick and eight-inch casings should be 0.322-inches thick. Although the wells may have met regulations at the time of their construction, the wells were assessed an additional system construction point because they did not meet the current, stricter standards.

## Potential Contaminant Source and Land Use

The wells rated low for IOC, VOCs, SOC, and microbial contaminants. The large amount of undeveloped forestland/rangeland surrounding the wells kept the scores reduced, but the presence of local access roads, Badger Gulch, and Dunnigan Creek contributed to the scores.

## Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, potential contaminant sources within 50 feet of a wellhead will automatically lead to a high susceptibility rating. In this case, Well #1 Upper automatically rates high for VOCs and SOC because access is not restricted to vehicular access within 50 feet of the wellheads. Well #2 Lower automatically rates high for IOC due to high arsenic content in the water (March 1995). Well #3 automatically rates high for IOC due to multiple arsenic MCL violations and high for VOCs due to the detection of toluene (December 1997). Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) contribute greatly to the overall ranking. If the vehicular traffic could be excluded within 50 feet of the Well #1 Upper, the overall susceptibility would be reduced to moderate for all categories. Well #2 Lower and Well #4 rated moderate for all categories, except as noted above. Well #3 rated low susceptibility for SOC and microbial contaminants.

**Table 2. Summary of Mores Creek Rim Ranch Water District Susceptibility Evaluation**

Well	Susceptibility Scores <sup>1</sup>									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1 Upper-Lot 52	H	L	L	L	L	M	M	H*	H*	M
Well #2 Lower	M	L	L	L	L	M	H**	M	M	M
Well #3-Lot 10	M	L	L	L	L	M	H**	H***	L	L
Well #4	M	L	L	L	L	H	M	M	M	M

<sup>1</sup>H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

H\* = well rated automatically high due to unrestricted vehicular access

H\*\* = well rated automatically high due to high arsenic content

H\*\*\* = well rated automatically high due to toluene detection

## Susceptibility Summary

The Mores Creek Rim Ranch Water District public water system (PWS #4080029) consists of four wells: Well #1 Upper-Lot 52, Well #2 Lower, Well #3-Lot 10, and Well #4. The system serves approximately 180 people through 62 connections. The wells are located to the east of Mores Creek (Figure 1).

In terms of total susceptibility, Well #1 Upper-Lot 52 automatically rated high for VOCs and SOC's because access is not restricted to vehicular traffic within 50 feet of the wellhead. Well #2 Lower and Well #3 automatically rated high for IOC's due to arsenic MCL violations. Well #3-Lot 10 rated automatically high susceptibility for VOCs due to a detection of toluene in the tested water. Except for these cases, Well #1 Upper-Lot 52, Well #2 Lower, and Well #4 rate moderate for all categories of contaminants. Well #3-Lot 10 rated low susceptibility for SOC's and microbial contaminants. System construction scores rated moderate to high and hydrologic sensitivity scores rated moderate to high for all the wells. Potential contaminant inventory/land use scores were low for IOC's, VOCs, SOC's, and microbials.

No SOC's or microbials have ever been detected in the tested water. Well #3-Lot 10 recorded the VOC toluene at a level of 33.8 parts per billion (ppb) in December 1997 as well as the VOC chloroform in December 1997. Chloroform is usually related to disinfection processes and is generally not a problem with the source water. Traces of the IOC's fluoride, aluminum, hydrogen sulfide, iron, lead, nickel, zinc, and nitrate have been detected in the wells.

The primary contaminant issue with the Mores Creek Rim Ranch Water District is arsenic. Since March 1995, arsenic has exceeded the MCL of 50 ppb. In March 1995, arsenic was measured at 154 ppb in Well #2 Lower. In February through June 2000, arsenic was measured at levels between 65 ppb and 190 ppb. In October 2001, the EPA lowered the MCL for arsenic from 50 ppb to 10 ppb, giving systems until 2006 to come into compliance. In December 2001, arsenic was measured at 114 ppb.

## **Section 4. Options for Drinking Water Protection**

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the Mores Creek Rim Ranch Water District, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. Actions should be taken to keep a 50-foot radius circle around the wellhead clear of potential contaminants. Restricting access to vehicles and other unauthorized access within this 50-foot radius circle would reduce the susceptibility scores of Well #1 Upper-Lot 52 from high to moderate. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated assessment areas are outside the direct jurisdiction of Mores Creek Rim Ranch Water District, collaboration and partnerships with state and local agencies and industry groups should be established and are critical to success.

Because the arsenic in the wells has exceeded the level of the original and revised MCL, the Mores Creek Rim Ranch Water District water users may need to consider implementing engineering controls to monitor and maintain or reduce the level of this contaminant in the water system. The EPA plans to provide up to \$20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the recently revised MCL. EPA (2002) recently released issue papers entitled *Proven Alternatives for Aboveground Treatment of Arsenic in Groundwater* and *Arsenic Treatment Technologies for Soil, Waste, and Water* (EPA 542-R-02-004). These issue papers discuss various treatment options for arsenic and give examples of where each of these technologies have been applied. Information can be accessed at the following EPA website <http://www.epa.gov/safewater/arsenic.html>.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation is near residential land uses areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. The primary source of potential contaminants comes from the transportation corridors within the delineations. Therefore the Department of Transportation and/or other federal and state agencies should be involved in protection activities.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Boise Regional Office of the DEQ or the Idaho Rural Water Association.

## **Assistance**

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Boise Regional DEQ Office (208) 373-0550

State DEQ Office (208) 373-0502

Website <http://www.deq.state.id.us>

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper ([mlharper@idahoruralwater.com](mailto:mlharper@idahoruralwater.com)), Idaho Rural Water Association, at 1-208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

## POTENTIAL CONTAMINANT INVENTORY

### LIST OF ACRONYMS AND DEFINITIONS

**AST (Aboveground Storage Tanks)** – Sites with aboveground storage tanks.

**Business Mailing List** – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

**CERCLIS** – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund, is designed to clean up hazardous waste sites that are on the national priority list (NPL).

**Cyanide Site** – DEQ permitted and known historical sites/facilities using cyanide.

**Dairy** – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

**Deep Injection Well** – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

**Enhanced Inventory** – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

**Floodplain** – This is a coverage of the 100year floodplains.

**Group 1 Sites** – These are sites that show elevated levels of contaminants and are not within the priority one areas.

**Inorganic Priority Area** – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

**Landfill** – Areas of open and closed municipal and non-municipal landfills.

**LUST (Leaking Underground Storage Tank)** – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

**Mines and Quarries** – Mines and quarries permitted through the Idaho Department of Lands.)

**Nitrate Priority Area** – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

**NPDES (National Pollutant Discharge Elimination System)** – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

**Organic Priority Areas** – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

**Recharge Point** – This includes active, proposed, and possible recharge sites on the Snake River Plain.

**RICRIS** – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

**SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities)** – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

**Toxic Release Inventory (TRI)** – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

**UST (Underground Storage Tank)** – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

**Wastewater Land Applications Sites** – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

**Wellheads** – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

**NOTE:** Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

## References Cited

- Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."
- Idaho Department of Agriculture, 1998. Unpublished Data.
- Idaho Department of Environmental Quality, 1998. Amendment to Sanitary Survey Report dated February 19, 1998.
- Idaho Department of Environmental Quality, 1998. Groundwater Under Direct Influence (GWUDI) Field Survey Report.
- Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.
- Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.
- Idaho Division of Environmental Quality, 1999, Idaho Source Water Assessment Plan, October, 39 p.
- Idaho Division of Environmental Quality, 1997, Idaho Wellhead Protection Plan, Idaho Wellhead Protection Work Group, February.
- Idaho Geological Survey, 1991, Geologic Map of the Hailey Qualdrance, Ron G. Worl et. Al., Open File Report 91-340, 1 plate 1:250,000.
- Kiilsgard, T.H., Scanlan, T.M., and D.E. Stewart, 1997, Geology of the Boise Basin Vicinity, Boise, Ada, and Elmore Counties, Idaho: Idaho Geological Survey Map 7, 1 plate 1:50,000.
- Othberg, K.L., 1994, Geology and Geomorphology of the Boise Valley and Adjoining Areas, Western Snake River Plain, Idaho: Idaho Geological Survey Bulletin 29, 54 pages, 1 plate.
- Scanlan, T.M., 1986, Geology and Landslide Hazards of the Dunnigan Creek 7½Minute Quadrangle, Boise County, Idaho: Master Thesis, University of Idaho, 67 pages, 2 plates.
- Theis, C.V., 1935, The Relation between Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage, Trans. Amer. Geophysical Union, v. 16, pp. 519-524.
- USGS, 1957, Dunnigan Creek, Idaho Topographic Quadrangle.
- USGS, 1957, Idaho City, Idaho Topographic Quadrangle.
- USGS, 1957, Pioneerville, Idaho Topographic Quadrangle.

## Attachment A

# Mores Creek Rim Ranch Water District Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- $\geq 13$  High Susceptibility

## 1. System Construction

SCORE

Drill Date	10/20/1977	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1998
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0

Total System Construction Score 4

## 2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	YES	1
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	NO	2

Total Hydrologic Score 6

## 3. Potential Contaminant / Land Use - ZONE 1A

IOC Score	VOC Score	SOC Score	Microbial Score
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Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	NO	YES	YES	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0

## Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2 ) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0

Total Potential Contaminant Source / Land Use Score - Zone 1B 3 3 3 2

## Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	

Potential Contaminant Source / Land Use Score - Zone II 0 0 0 0

## Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	

Total Potential Contaminant Source / Land Use Score - Zone III 0 0 0 0

Cumulative Potential Contaminant / Land Use Score 3 3 3 2

4. Final Susceptibility Source Score	11	11	11	11
5. Final Well Ranking	Moderate	High	High	Moderate

## 1. System Construction

SCORE

Drill Date	06/06/1992	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1998
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	YES	0

Total System Construction Score 3

## 2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0

Total Hydrologic Score 3

## 3. Potential Contaminant / Land Use - ZONE 1A

IOC Score	VOC Score	SOC Score	Microbial Score
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Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0

## Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2 ) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0

Total Potential Contaminant Source / Land Use Score - Zone 1B 3 3 3 2

## Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	

Potential Contaminant Source / Land Use Score - Zone II 0 0 0 0

## Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	

Total Potential Contaminant Source / Land Use Score - Zone III 0 0 0 0

Cumulative Potential Contaminant / Land Use Score 3 3 3 2

4. Final Susceptibility Source Score	7	7	7	7
5. Final Well Ranking	High	Moderate	Moderate	Moderate

## 1. System Construction

SCORE

Drill Date	10/27/1997	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	YES	1998
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	YES	0
Casing and annular seal extend to low permeability unit	YES	0
Highest production 100 feet below static water level	NO	1
Well located outside the 100 year flood plain	YES	0

Total System Construction Score 2

## 2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	YES	0
Aquitard present with > 50 feet cumulative thickness	YES	0

Total Hydrologic Score 2

## 3. Potential Contaminant / Land Use - ZONE 1A

IOC Score	VOC Score	SOC Score	Microbial Score
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Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	YES	YES	YES	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0

## Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2 ) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0

Total Potential Contaminant Source / Land Use Score - Zone 1B 3 3 3 2

## Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	

Potential Contaminant Source / Land Use Score - Zone II 0 0 0 0

## Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	

Total Potential Contaminant Source / Land Use Score - Zone III 0 0 0 0

Cumulative Potential Contaminant / Land Use Score 3 3 3 2

4. Final Susceptibility Source Score	5	5	5	5
5. Final Well Ranking	High	High	Low	Low

## 1. System Construction

SCORE

Drill Date	11/07/1997	
Driller Log Available	YES	
Sanitary Survey (if yes, indicate date of last survey)	NO	0
Well meets IDWR construction standards	NO	1
Wellhead and surface seal maintained	NO	1
Casing and annular seal extend to low permeability unit	NO	2
Highest production 100 feet below static water level	YES	0
Well located outside the 100 year flood plain	NO	1

Total System Construction Score 5

## 2. Hydrologic Sensitivity

Soils are poorly to moderately drained	NO	2
Vadose zone composed of gravel, fractured rock or unknown	NO	0
Depth to first water > 300 feet	NO	1
Aquitard present with > 50 feet cumulative thickness	YES	0

Total Hydrologic Score 3

## 3. Potential Contaminant / Land Use - ZONE 1A

IOC Score	VOC Score	SOC Score	Microbial Score
-----------	-----------	-----------	-----------------

Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		0	0	0	0

## Potential Contaminant / Land Use - ZONE 1B

Contaminant sources present (Number of Sources)	YES	1	1	1	1
(Score = # Sources X 2 ) 8 Points Maximum		2	2	2	2
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
4 Points Maximum		1	1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0

Total Potential Contaminant Source / Land Use Score - Zone 1B 3 3 3 2

## Potential Contaminant / Land Use - ZONE II

Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	

Potential Contaminant Source / Land Use Score - Zone II 0 0 0 0

## Potential Contaminant / Land Use - ZONE III

Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	

Total Potential Contaminant Source / Land Use Score - Zone III 0 0 0 0

Cumulative Potential Contaminant / Land Use Score 3 3 3 2

4. Final Susceptibility Source Score	9	9	9	9
5. Final Well Ranking	Moderate	Moderate	Moderate	Moderate